

# High Current Density Surface-Mount TMBS<sup>®</sup> (Trench MOS Barrier Schottky) Rectifier

 Ultra Low  $V_F = 0.50\text{ V}$  at  $I_F = 5\text{ A}$ 

**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

## FEATURES

- Very low profile - typical height of 1.3 mm
- Trench MOS Schottky technology
- Ideal for automated placement
- Low forward voltage drop, low power losses
- High efficiency operation
- Meets MSL level 1, per J-STD-020, LF maximum peak of 260 °C
- AEC-Q101 qualified available  
- Automotive ordering code: base P/NHM3
- Material categorization: for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)

## DESIGN SUPPORT TOOLS AVAILABLE



## TYPICAL APPLICATIONS

For use in low voltage high frequency DC/DC converters, freewheeling diodes, and polarity protection applications.

## MECHANICAL DATA

**Case:** SlimDPAK (TO-252AE)

Molding compound meets UL 94 V-0 flammability rating

Base P/N-M3 - halogen-free, RoHS-compliant

Base P/NHM3 - halogen-free, RoHS-compliant, and AEC-Q101 qualified

**Terminals:** matte tin plated leads, solderable per J-STD-002 and JESD 22-B102

M3 and HM3 suffix meets JESD 201 class 2 whisker test

PRIMARY CHARACTERISTICS	
$I_{F(AV)}$	40 A
$V_{RRM}$	120 V
$I_{FSM}$	240 A
$V_F$ at $I_F = 20\text{ A}$ ( $T_A = 125\text{ °C}$ )	0.70 V
$T_J$ max.	175 °C
Package	SlimDPAK (TO-252AE)
Circuit configuration	Common cathode

MAXIMUM RATINGS ( $T_A = 25\text{ °C}$ unless otherwise noted)			
PARAMETER	SYMBOL	V40PWM12C	UNIT
Device marking code		V40PWM12C	
Maximum repetitive peak reverse voltage	$V_{RRM}$	120	V
Maximum average forward rectified current (Fig. 1)	$I_{F(AV)}$ <sup>(1)</sup>	per device	40
		per diode	20
Peak forward surge current 8.3 ms single half sine-wave superimposed on rated load per diode	$I_{FSM}$	240	A
Operating junction temperature range	$T_J$ <sup>(2)</sup>	-40 to +175	°C
Storage temperature range	$T_{STG}$	-55 to +175	°C

### Notes

<sup>(1)</sup> With infinite heatsink

<sup>(2)</sup> The heat generated must be less than the thermal conductivity from junction to ambient:  $dP_D/dT_J < 1/R_{\theta JA}$



ELECTRICAL CHARACTERISTICS ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)						
PARAMETER	TEST CONDITIONS		SYMBOL	TYP.	MAX.	UNIT
Instantaneous forward voltage per diode	$I_F = 5.0\text{ A}$	$T_A = 25\text{ }^\circ\text{C}$	$V_F^{(1)}$	0.58	-	V
	$I_F = 10\text{ A}$			0.70	-	
	$I_F = 20\text{ A}$			0.92	1.00	
	$I_F = 5.0\text{ A}$	$T_A = 125\text{ }^\circ\text{C}$		0.50	-	
	$I_F = 10\text{ A}$			0.59	-	
	$I_F = 20\text{ A}$			0.70	0.78	
Reverse current per diode	$V_R = 90\text{ V}$	$T_A = 25\text{ }^\circ\text{C}$	$I_R^{(2)}$	0.01	-	mA
		$T_A = 125\text{ }^\circ\text{C}$		3.5	-	
	$V_R = 120\text{ V}$	$T_A = 25\text{ }^\circ\text{C}$		-	0.5	
		$T_A = 125\text{ }^\circ\text{C}$		7	20	
Typical junction capacitance	4.0 V, 1 MHz		$C_J$	1440	-	pF

**Notes**

- (1) Pulse test: 300  $\mu\text{s}$  pulse width, 1 % duty cycle  
(2) Pulse test: pulse width  $\leq 5\text{ ms}$

THERMAL CHARACTERISTICS ( $T_A = 25\text{ }^\circ\text{C}$ unless otherwise noted)			
PARAMETER	SYMBOL	V40PWM12C	UNIT
Typical thermal resistance	$R_{\theta JA}^{(1)(2)}$	55	$^\circ\text{C/W}$
	$R_{\theta JM}^{(3)}$	1.5	

**Notes**

- (1) The heat generated must be less than thermal conductivity from junction-to-ambient:  $dP_D/dT_J < 1/R_{\theta JA}$   
(2) Free air, mounted on recommended copper pad area; thermal resistance  $R_{\theta JA}$  - junction to ambient  
(3) Mounted on infinite heat sink; thermal resistance  $R_{\theta JM}$  - junction-to-mount

ORDERING INFORMATION (Example)				
PREFERRED P/N	UNIT WEIGHT (g)	PREFERRED PACKAGE CODE	BASE QUANTITY	DELIVERY MODE
V40PWM12C-M3/I	0.20	I	4500	13" diameter plastic tape and reel
V40PWM12CHM3/I <sup>(1)</sup>	0.20	I	4500	13" diameter plastic tape and reel

**Note**

- (1) AEC-Q101 qualified



RATINGS AND CHARACTERISTICS CURVES (T<sub>A</sub> = 25 °C unless otherwise noted)

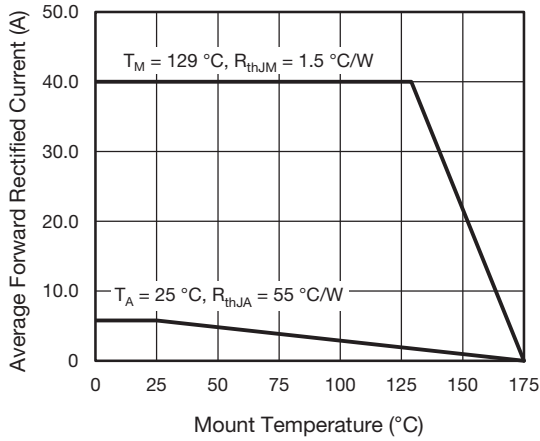


Fig. 1 - Maximum Forward Current Derating Curve

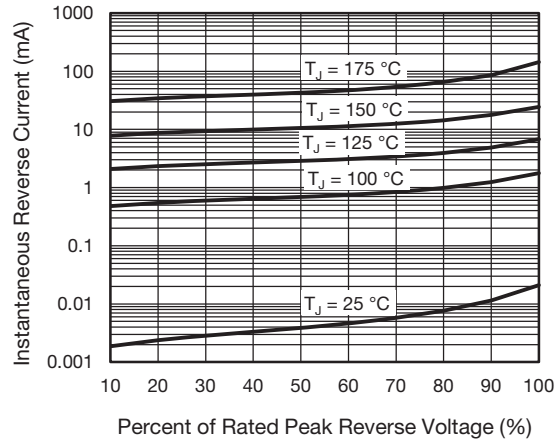


Fig. 4 - Typical Reverse Leakage Characteristics

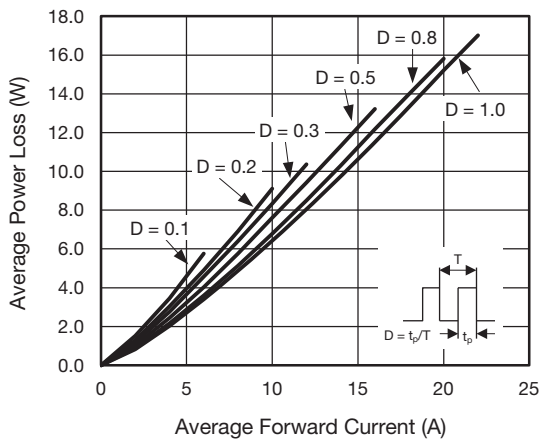


Fig. 2 - Forward Power Loss Characteristics

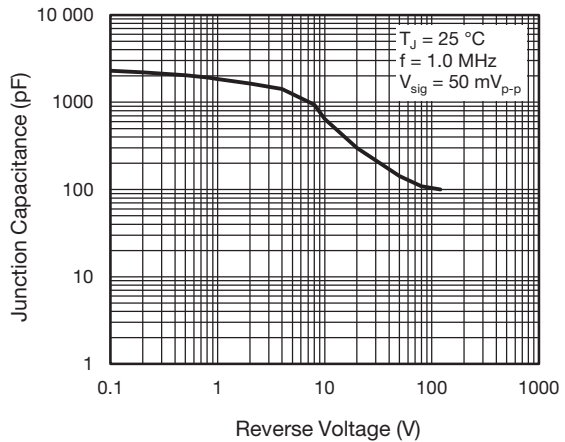


Fig. 5 - Typical Junction Capacitance

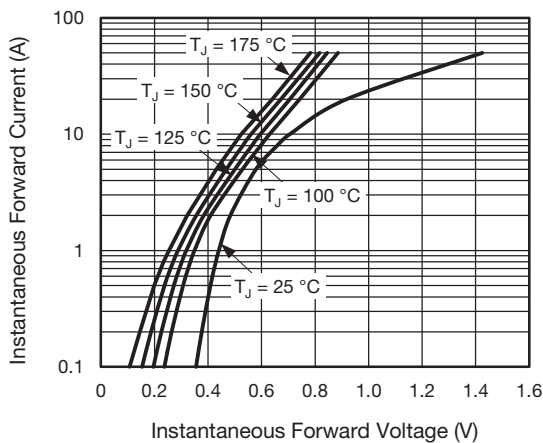


Fig. 3 - Typical Instantaneous Forward Characteristics

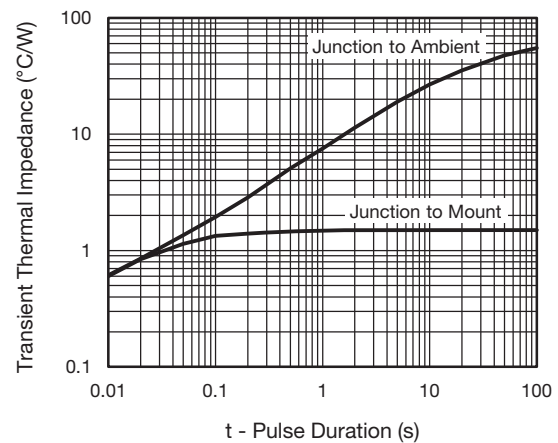


Fig. 6 - Typical Transient Thermal Impedance

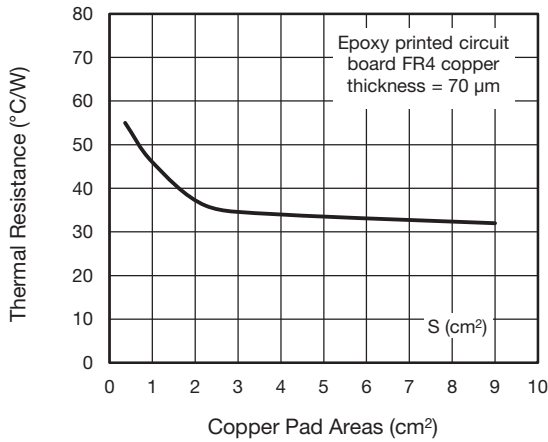
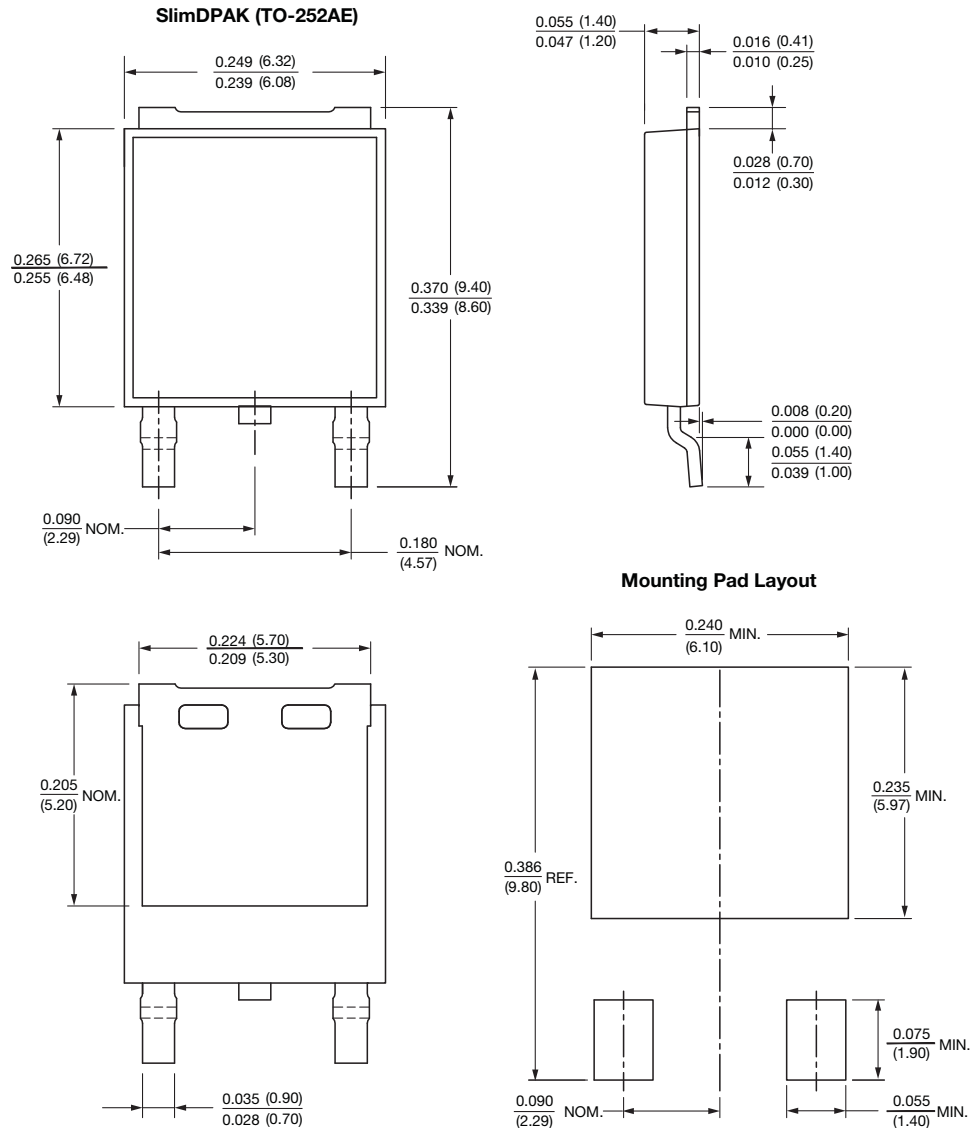


Fig. 7 - Typical Resistance Junction to Ambient vs. Copper Pad Areas

**PACKAGE OUTLINE DIMENSIONS** in inches (millimeters)





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